City of Tacoma
Public Works Department

March 31, 1999

Melodie Selby, P.E.
Section Manager
Water Quality Program
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Dear Ms. Selby:

This annual report is submitted by the City of Tacoma pursuant to Special Condition S10 of the NPDES and State Waste Discharge General Permit for stormwater discharges from municipal separate storm sewers for the South Puget Sound Water Quality Management Area. This report covers activities completed in 1998.

Even though the City of Tacoma has not yet received approval of its Stormwater Management Program, the City has a stormwater program consisting of a variety of components. The City's stormwater program activities during 1998 are described in the enclosed report.

I certify under penalty of law that this annual report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for willful violations.

The Thea Foss and Wheeler-Osgood Waterways Stormwater Monitoring Sampling and Analysis Plan is also enclosed.

If you have any questions regarding these reports, please contact Patrick Yamashita, P.E., at (253) 502-2119.

Sincerely,

John D. Stetson, P.E.
Division Manager
Utility Services Engineering

JDS:CLS:sh (NPDES0399)

Enclosures

cc: Terra Hege, Ecology
Ed O'Brien, Ecology
Joyce Mercuri, Ecology
Patrick Yamashita, Utility Services Engineering
Mary Henley, Utility Services Engineering
Troy Naccarato, Utility Services Engineering
Chris Getchell, Utility Services Laboratory (5)

File: NPDES

City of Tacoma
NPDES Annual Report

March 31, 1999

This annual report is for the reporting period January through December 1998.

1. Status of implementing the components of the stormwater management program.

The City is currently working with the Department of Ecology (Ecology) to gain approval of its stormwater management program (SWMP.) Since portions of the SWMP are being redrafted and the program has not yet been approved, the report does not describe the actual implementation of the components of the stormwater management program. The report does, however, describe the stormwater activities that were performed during the course of the reporting period. The report also projects some of the program components into the future as per the schedule in the draft SWMP. The format described in the permit is used for this report.

Even though the City's SWMP has not yet been approved, it has been submitted to Ecology for review and a public workshop and hearing are scheduled for April 29, 1999. The City has been implementing many of the required program components on an ongoing basis. The ongoing stormwater program components include the following: data management, intergovernmental coordination, regulations for new and redevelopment projects, street and storm drainage maintenance, elimination of illicit discharges, industrial monitoring and control, and education.

S7B1 Stormwater Management Program Planning Process

The City is working with Ecology to finalize its Stormwater Management Program.

Stormwater Utility staff worked with managers and staff from several divisions of the Public Works Department to compile the information needed for this report. Participation by elected officials and the public took place in 1995 and in the first half of 1996. A City Council Study Session on the SWMP has been scheduled for April 20, 1999.

S7B2 Water Quality Problems, Needs and Priorities

Analysis of needs and priorities

The analysis of needs and priorities has been submitted to Ecology as part of the City's SWMP. The SWMP includes all of the City's unmet stormwater needs. They are prioritized as high, medium and low and a schedule is included for addressing how the high and medium priority unmet needs will be addressed during the term of the current permit.

S7B3 Legal Authority

Adoption and enforcement of ordinance containing standards equivalent to the minimum requirements of Ecology's Stormwater Management Manual

The City has existing ordinances that regulate new and redevelopment projects. The City's draft stormwater management program has scheduled a revision of these ordinances to take place in 1999 and 2000 in order to be equivalent with the minimum requirements of Ecology's Stormwater Management Manual.

Adoption and enforcement of ordinance prohibiting pollution discharges to the City's municipal stormwater system

The City has an existing ordinance that addresses the discharge of pollutants to the City's stormwater system. The City's draft stormwater management program has scheduled a modification and expansion of this ordinance in 1999 and 2000.

S7B4 Monitoring

The City's draft stormwater management program includes a monitoring program. The monitoring activities are scheduled for implementation in 1999 and 2000.

The City is currently doing limited stormwater monitoring. There is an official weather station at the Central Wastewater Treatment Plant and 4 rain gauges located throughout the City. The rain gauge information is recorded and used as needed. The City contracts with a weather service and receives weather reports twice a day. This information provides an early warning of heavy rains and potential flooding. Maintenance crews are dispatched to proactively check and maintain trouble spots prior to anticipated heavy rains to ensure the proper operation of the system.

A local bay-watch telephone hotline was established in 1998 to allow the public to report water pollution problems. During normal working hours, the City stormwater staff will respond to the calls and calls after hours will be forwarded to voice mail. The City and Ecology staff will coordinate their actions.

City staff monitor the shorelines of the entire Commencement Bay area by City vessel. This is done on a monthly basis. Sections of the shorelines are videotaped. The monitoring will be done at low tide to the extent practicable. Identified problems will be addressed.

Stream Team volunteers do limited stream monitoring in several streams. They monitor for pH, temperature and other parameters.

Developers are required to monitor wetlands in areas where wetlands could be impacted by development. They are required to submit reports. Approximately one-half of the City's Wetlands Specialist's time is spent on wetland monitoring activities. These activities include review of monitoring reports submitted as part of the permit approval process, tracking violations and monitoring shorelines.

Storm sewer monitoring in commercial/industrial areas

City staff performed a variety of monitoring activities in commercial and industrial sites in 1998. Source control sampling was done on an as needed basis as part of the business inspection program. Other sampling was done in the investigation of specific problem areas. These problem areas are outlined in Section 7 - Identification of known water quality improvements or degradation.

Sediment traps were deployed in 1998 as follow-up to sampling conducted in 1997. All 8 locations were re-sampled and 5 additional locations were identified and sampled. The sample results were published in December 1998 by Dale Norton in the following document: "1998 Sediment Trap Monitoring of Suspended Particulates in Stormwater Discharges to Thea Foss Waterway."

S7B5 Fiscal Analysis

During the reporting period of January 1, 1998 through December 31, 1998, the stormwater utility spent $16.2 million. The expenditure categories are as follows:

OPERATIONS:

Transmission	
Personal Services	$585,676.63
Supplies & Other Services and Charges	340,779.26
Miscellaneous Capital Outlay	885.78
Total	**$927,341.67**
Pumping	
Personal Services	$57,513.45
Supplies & Other Services and Charges	145,162.71
Total	**$202,676.16**
Holding Basins	
Personal Services	$40,398.77
Supplies & Other Services and Charges	19,415.07
Total	**$59,813.84**
Engineering	
Personal Services	$351,730.95
Supplies & Other Services and Charges	31,909.56
Miscellaneous Capital Outlay	10,010.74
Total	**$393,651.25**

Source Control

Personal Services	$555,660.95
Supplies & Other Services and Charges	1,795,705.99
Total	**$2,351,366.94**

Laboratory

Personal Services	$310,630.60
Supplies & Other Services and Charges	56,339.90
Miscellaneous Capital Outlay	--
Total	**$366,970.50**

MISCELLANEOUS:

General Services

Personal Services	$439,601.47
Supplies & Other Services and Charges	2,902,485.58
Miscellaneous Capital Outlay	237,406.32
Debt Service	--
Total	**$3,579,493.37**

Debt Service

Principal and Interest	$2,555,087.26
Other	59,469.00
Total	**$2,614,556.26**

Other Department Divisions not included above:

Miscellaneous
unknown at this time

Capital Projects:

T-Street Gulch	$1,849,529.62
Coal Gasification Cleanup	(59,355.53)
Hosmer Basin	18,585.61
Foss Waterway Cleanup	1,351,878.36
NE Tacoma System	846,334.66
NRDA	1,071,957.65
Misc. Superfund	--
Miscellaneous	587,707.47
Total	**$5,666,637.84**

A description of the types of activities associated with the above expenditures is contained in Volume 3 of Tacoma's Stormwater Management Manual. Relating the budget amount in each of the above categories to the actual expenditures is very difficult at this time. Some activities are

budgeted in one activity or organization but are actually spent and therefore charged to a different activity or organization. As a result, the actual expenditure in any one line item does not necessarily relate to the budget number for that same category. Some capital expenditures may be budgeted in the operating budget but the expenditure is taken from the capital budget and vice versa.

The expected revenue from rates in 1999 is $ 13.5 Million. The anticipated expenditures for the 1999 year will likely be greater than in 1998. This is due to increasing activities in the Stormwater Utility. There will be increased emphasis on source control, public education, and on revising the stormwater manual as required by the Department of Ecology. In addition, there are numerous planning, design and construction activities funded by the Utility. Some of these are to comply with Federal and/or state orders, consent decrees, mandates, etc. Finally, there will be added demands on staff and Utility resources as the impact of the listing of salmon under the Endangered Species Act is felt.

S7B6 Data Management

Development of land cover information maps and data

A GIS mapping system has been in use for the past several years. A source control data base for industrial and commercial sites has been developed. It tracks business inspections and compliance status.

Description and location of major structural BMPs and other structural controls

The City developed a map that shows the location and type of all public and private water quality and water quantity facilities.

Mapping storm sewer outfalls and tributary conveyances

This type of mapping is complete and has been available for many years.

Water quality complaint investigations and data base development and maintenance

A customer request data base has been developed for residential requests. A separate business data base is currently in use.

S7B7 Intergovernmental Coordination

General coordination for monitoring, mapping, data management and modeling

The City coordinates a variety of activities with other municipalities and agencies. Issues related to the Flett drainage basin are coordinated with Pierce County, Lakewood and the Washington State Department of Transportation (WSDOT). Activities related to the ASARCO site are coordinated with the City of Ruston, Metro Parks Tacoma and the United States Environmental Protection Agency (EPA). Issues related to the clean up of the Foss Waterway are coordinated with WSDOT, EPA, the Army Corps of Engineers, the Washington State Department of Natural Resources, the Puyallup Tribe and Ecology. Activities related to the T-Street drainage basin are coordinated with Pierce County. Activities related to the Leach Creek drainage basin are coordinated with WSDOT and the cities of University Place and Fircrest. Activities in NE Tacoma, including the Joe's Creek drainage basin, are coordinated with Federal Way.

General coordination for control of stormwater pollution from other jurisdictions
The City coordinates with other jurisdictions and agencies in a variety of ways. The City participates in the NPDES municipal permittees group, the Puyallup River Watershed Council and the APWA Stormwater Managers' Meetings. Funds are provided to the Pierce County Conservation District to support the Stream Team which is sponsored by Tacoma, Pierce County, Puyallup, Fife and Sumner.

Development of coordinated SWMPs for waterbodies shared with other municipal permittees
The City coordinates with other municipalities to address stormwater concerns in shared waterbodies as described above.

S7B8a Runoff from new development and redevelopment
Development of ordinance containing minimum technical requirements equivalent to Ecology's manual
A draft manual has been written and was submitted to Ecology in 1995 for comments. It will be resubmitted to Ecology along with an equivalency document in 1999. The manual will be finalized in early 2000. Training on manual implementation will be done in 1999 and 2000.

Stormwater plans for all new development and redevelopment projects are being reviewed and then the projects are inspected in the field. Many aspects of the draft manual, including the detention release rates are being implemented in this process.

Staff provide consultations and educational meetings with developers, planners and engineers involved in the land development process.

The Building and Land Use Services Division of the Public Works Department distributes NPDES Construction Notice of Intent forms to all developers who have projects that will include 5 acres or more of land clearing activities. These projects require a separate NPDES permit from Ecology.

S7B8b Existing Residential and Commercial Development Runoff
Drainage channel stabilization improvements were made in the mostly residential T-Street drainage basin to mitigate ongoing erosion and sediment control problems. Improvements were also made to reduce peak flows in Joe's Creek, thereby reducing erosion, sedimentation and flooding problems. These improvements included a two-cell wet detention pond and 2 wet ponds within the Northshore Golf Course. One of the ponds is also used for irrigation of the golf course.

The City's stormwater Source Control staff inspect existing commercial and industrial sites for compliance with applicable stormwater regulations. Problems are identified and are corrected. The corrections can include the addition of structural or non-structural BMPs necessary to solve the problem.

S7B8c Municipal Storm Sewer Operation and Maintenance

The Public Works Department has a Sewer Maintenance Division that maintains both the storm drainage and the sanitary sewer systems. The following tables indicate the level of maintenance efforts that were completed during the reporting period.

JANUARY 1998 - DECEMBER 1998

# CBs cleaned	5,785
# CBs checked	2,501
Ditches cleaned	117 blocks
# Culverts cleaned	338
# Scuppers cleaned	156
Main Storm lines cleaned	58 blocks
Main Storm lines backcut	29 blocks
# Storm Manholes cleaned	150
# Storm Manholes checked	485
# Feet In-House Storm TV Inspections	17,684
# Feet Pay Storm TV Inspections	8,842

The Transmission Section of the Sewer Operation and Maintenance Division has been revising its practices. They have developed Maintenance Performance Standards to reduce maintenance costs and to improve productivity, efficiency and work quality. They have also developed an annual work program that identifies the kind and amount of work needed to successfully maintain the system. Improvements have also been made to the Information Management System to include planning and scheduling of maintenance work.

Development and implementation of an ordinance defining private storm sewer system maintenance responsibilities is scheduled in the draft SWMP to take place in 1999 and 2001 along with the other legal requirements.

Vactor waste is currently being decanted. The dry material is used at the landfill as daily cover. The liquid waste is being discharged to the sanitary sewer. Testing of both the dry and liquid components is currently being done.

S7B8d City Road Operation and Maintenance

The Public Works Department has a Street Maintenance Division that maintains the City's streets. The City owns 4 street sweepers and 2 or 3 of them are in operation at any one time. Over the last 12 months, approximately 4,368 miles of street were swept and 4,500 cubic yards of material were collected.

S7B8e Water Quality Considerations in Flood Management Projects

A flood management project was constructed in the T-Street drainage basin to reduce erosion and sediment problems. Another project was constructed to reduce flooding, erosion and sediment

problems in Joe's Creek. Part of the project included a two-celled wet detention pond and 2 water quality wet ponds on the Northshore Golf Course.

S7B8f Runoff from Pesticide and Fertilizer Application

Educational efforts in this area were incorporated into the City's overall educational programs.

S7B8g Illicit Storm Sewer Discharge Elimination

The elimination of illegal discharges is one of the City's top stormwater priority. The City currently has a ordinance that is used to enforce the elimination of illicit discharges. This ordinance will be revised and updated in 1999 and 2000 when the City plans to update its drainage ordinance to meet the new requirements.

The City has two full time staff people devoted to the stormwater program and the elimination of illicit discharges. When they do business inspections, they provide the business operators with technical assistance regarding the elimination of illicit discharges and they educate business operators about the proper BMPs to use. Volume II of the City's Stormwater Management Manual, "A Guide to Best Management Practices for Industries, Businesses and Homeowners", is used in the industrial stormwater program for guidance in the storage and containment of chemicals.

The field staff observe or assist emergency response agencies with spill response activities. They provide the agencies with information on the City's stormwater system with the goal of keeping the spilled material out of the system. They have worked with mobile washers and charity car wash operators to ensure that these types of washing activities are done correctly. They have also worked with the Tacoma Fire Department and with other City facilities to ensure that vehicle wash water is disposed properly. The field staff also responds to general concerns regarding water quality problems.

The City has a new household hazardous waste disposal and recycling center located at the landfill. This facility provides a place for the community to safely dispose of waste products that otherwise might end up in a storm drain.

S7B8h Industrial Stormwater Monitoring and Control

The City reviews all commercial plans for adequacy of the private storm sewer systems and their connection to the City's system. New construction is inspected to ensure compliance with City requirements.

The City's two stormwater Source Control staff inspect industrial sites. The industrial inspections are coordinated with Ecology staff as appropriate. This coordination includes the referral of problem sites to Ecology when the industry has an industrial NPDES permit.

The staff members have developed an inventory of sites and have the inventory on a computerized data base.

S7B8i Stormwater Education

Employee Education:

The City encourages its stormwater staff to participate in continuing education. The staff has attended classes on implementation of BMPs, innovative BMPs, water quantity and other topics directly related to stormwater. City staff also participates in the APWA Stormwater Managers' Meetings, the NPDES Municipal Permittees Work Group and the Puyallup River Watershed Council. All of these provide opportunities for additional stormwater education.

Public Education:

The City has an extensive public educational program. The Stream Team, a multi-jurisdictional effort, sponsors storm drain stenciling. They also offer other programs such as wetland and stream bank clean ups and revegetation, workshops and tours. The Stream Team also has a water quality booth that is used at various community events including the Puyallup Fair and Maritime Fest.

The charity car wash program also received radio and newspaper coverage. The Nature Bowl program is a multi-jurisdictional effort to provide water quality information to grade school children and their teachers. The Stormwater Utility also distributed flyers and posters focused on things that the community could do to protect water quality such as car washing, auto maintenance, pet waste disposal and use of yard chemicals.

The Stormwater Utility, Sewer Utility, Solid Waste Utility and Tacoma Public Utilities are continuing an ongoing effort with the Tacoma School District to provide environmental education in the schools. The Utilities have paid the salary of a Curriculum Facilitator for Environmental Education. The Facilitator has developed an environmental curriculum for the schools. The Facilitator also coordinated two environmental workshops for teachers in the Fall of 1998. One workshop was on watersheds and one workshop was on forest and marine ecosystems.

The Stormwater Utility helps to sponsor the Nature Bowl program offered at the Nature Center at Snake Lake by various agencies. This provides an opportunity for educational interaction with both teachers and school kids with respect to water quality concerns.

The Stormwater Utility is continuing to work with Metro Parks to support a variety of educational efforts that will focus on stormwater and marine life. These activities will take place at the Point Defiance Zoo and Aquarium.

The City's Solid Waste Utility has an active educational program related to recycling activities. Their newest program is called "Talkin' Trash", and is described below:

> How do you get 51,000 residential customers to change just about everything about the way they deal with garbage?

That was the challenge for the City of Tacoma's Solid Waste Utility. How could we communicate all the details we needed, get people to change their behavior *and* convince Tacoma residents that garbage and recycling are fun?

Who're the most obvious folks to talk about garbage – why garbage men! So we found five of ours with good singing voices and tons of personality and created "The Collectors." Not only did "Tacoma's singing garbage men" sing about the service changes in radio ads and at public appearances, their images appeared in newspaper ads, transit bus signs, garbage truck signs and in mailers. Soon – just as we hoped – The Collectors became a media sensation attracting tons of attention in the local newspapers, radio stations and TV newscasts as well as garnering national (CNN) and international exposure (radio interviews from stations in Japan and South Africa).

That's how Tacoma started "Talkin' Trash." This was a very popular educational program. The most important thing for the Solid Waste Utility is that the customers "picked their can size, quickly learned their new day and are excited about recycling the new way." Plus, thanks to the singing garbage men, folks in Tacoma think garbage and recycling are fun!

The Stormwater Utility staff also participated in a variety of other educational activities such as meeting with high school students, assisting with the water quality booth at the Puyallup Fair, and doing water quality presentations.

S12 Thea Foss Waterway Basin Program

The City's NPDES municipal stormwater permit, issued in 1995, contained a special provision requiring the development of a stormwater program specific to the Foss Waterway. Much of the work to establish the program was done in 1995 and early 1996, prior to this reporting period.

In 1998, 22 full inspections, one drive-by inspection, and approximately 40 follow-up inspections were conducted at industries within the Thea Foss Subwatershed. Most of the full inspections were conducted in response to complaints or as new businesses were identified through the Commercial Customer List (JS005). The business inspections included: checking for illicit discharges, ensuring proper storage and maintenance activities, providing technical support and education regarding use of BMPs and sampling on-site and downstream as necessary. The inspections were documented and the information was input into a database. Enforcement actions taken in 1998 included one warning letter and one penalty (fine).

With regard to education, the City developed special kits for car washes sponsored by community groups. The kit, provided free of charge, contains all supplies necessary to keep dirty wash water from entering the storm drains. In addition, the City continues to provide residents and businesses with handouts and pamphlets pertaining to BMPs. Residential letters and pamphlets are routinely distributed in neighborhoods following complaint investigations. During inspections, businesses are provided both general and specific BMPs targeting applicable activities.

2. Notification of any recent or proposed annexations or incorporations

No areas were annexed during the reporting period for this report.

3. Differences between planned and actual expenditures

Relating the planned expenditures in each of the above categories to the actual expenditures is very difficult at this time. The City's budget and fiscal tracking systems are not structured to fit the NPDES needs. They were developed to comply with the State Auditor requirements and conform to the Government Accounting Procedures (GAP). Some activities are budgeted in one activity or organization but are actually spent and therefore charged to a different activity or organization. As a result, the actual expenditure in any one line item does not necessary relate to the budget number for that same category. And finally, some capital expenditures may be budgeted in the operating budget but the expenditure is taken from the capital budget and vice versa. We are continuing to work with the budget and fiscal offices to see if modifications can be made to eliminate these anomalies.

4. Revisions, if necessary, to the remaining years of the fiscal analysis reported in the approved stormwater management program.

This doesn't apply since the City's stormwater management program hasn't been approved.

5. For the fourth year report, a summary and analysis of the cumulative monitoring date collected throughout the term of the permit.

Not applicable for this report.

6. A summary describing compliance activities, including the nature and number of official enforcement actions, inspections and types of public education activities.

During this reporting period, the City's Stormwater Utility received 57 stormwater calls relating to water quantity and flooding concerns. Of these, 23 calls regarded water quality concerns including spill response. Most of the complaints are neighbors complaining about storage or disposal issues and some are from citizens reporting the same type of issues about businesses. Some of the complaints come from other agencies or City departments.

The Stormwater Utility is currently improving its tracking system for customer service requests relating to water quality and water quantity concerns. The improvements have included a new database. The database does not track specific enforcement activities such as letters sent. It will be modified to track these types of actions for 1999.

The customer service requests showed a dramatic decrease from those reported in the last annual report. As the new database has been utilized, the "insignificant" or very small calls are not tracked. A typical call of this type might involve a citizen's call after receipt of a stormwater bill. The citizen might complain that they are paying for stormwater, and they have a mud

puddle in their alley and want the City to install a catch basin. These types of calls are not being logged into the database.

The Building and Land Use Services Division of Public Works enforces the following ordinances: the clearing and grading ordinance includes erosion and sediment control, the critical areas ordinance which includes wetlands, and the shoreline management ordinance.

The wetland program has an active enforcement component. Seven different sites generated the following enforcement activities in 1998: 4 meetings, 4 first letters, 4 second letters and 2 third letters, 7 site inspections, 4 response letters, 3 re-inspections, 10 telephone calls and 1 stop work order. One of these sites was referred to the court system in early 1999. Five other sites were also investigated. Four of these sites involved violations of wetland permits. The last site was a plat where the land developer didn't comply with the plat requirements.

The business inspections completed in the Thea Foss Waterway watershed resulted in 2 enforcement actions. A warning letter was sent out and a penalty (fine) was assessed. Please refer to S12 - Thea Foss Waterway Basin Program for more information on the inspections. Fifteen follow-up letters were sent out after business inspections in other parts of the City.

Please refer back to S7B8i for information on public education activities.

7. Identification of known water quality improvements or degradation.

The City's stormwater Source Control staff worked on two projects in 1998 that resulted in immediate water quality improvements and on two projects that should result in water quality improvements in the near future.

In one investigation in 1998, City inspectors responded to a report of material entering a catch basin. Employees of parking lot service company had applied approximately 2,500 gallons of asphalt emulsion sealant to the parking lot at Lincoln Plaza, South 38th & Idaho Streets. Immediately following application, rain began flushing much of the uncured material into the storm drainage system. The company was issued a $750.00 penalty by Ecology in addition to a Resource Damage Penalty.

Another investigation, that started at the end of 1997, was resolved in early 1998. An unknown source of sediment was being discharged into Snake Lake through the City's stormwater pipe. A City inspector responded to a complaint and determined that a contractor at a nearby construction project had stockpiled material over a catch basin. This material was getting into the City's storm line and was being discharged into Snake Lake. The material was moved and the proper BMPs were implemented on the site eliminating the sediment problem.

An investigation at the Coal Tar Site, completed in late 1998, concluded that petroleum product was seeping into the on-site stormwater collection system which flows through Outfall #237A. The system was installed by the Department of Transportation during construction of the Tacoma Spur (I-705) in the mid-1980's. A Draft Agreed Order addressing the continuation of study and

remedial design activities at the site has been prepared by the Department of Ecology and is currently being reviewed by the Potentially Responsible Parties at the site. Source control for the on-site storm drainage system is one of the specific components of this Draft Order.

The last investigation, completed in 1998, concluded that heavy oil and hydrogen sulfide gases were infiltrating through cracks in the storm drainage pipe on East 19th Street, just east of East D Street. Evidence suggested that an abandoned fuel pipeline in East D Street was the likely source of petroleum contamination found in the ground and infiltrating into the storm pipe. The decomposition of buried wood waste in the area is suspected to be the source of elevated levels of hydrogen sulfide gas detected in this same area of the storm drainage system. Ecology's Urban Bay Action Team is currently assessing this potential source of contamination to the Foss Waterway. The City will be repairing sections of pipe in order to eliminate infiltration of product found during this investigation. We anticipate that this work will be completed in the Spring of 1999.

8. Status of watershed-wide coordination and activities which the permittee has undertaken individually or jointly as part of Special Condition S7B7.

Please refer back to S7B7 for information on watershed-wide coordination and activities.

THEA FOSS AND WHEELER-OSGOOD WATERWAYS
STORMWATER MONITORING

SAMPLING AND ANALYSIS PLAN

Prepared for:
DEPARTMENT OF ECOLOGY

Prepared by:
CITY OF TACOMA
March, 1999

Tacoma

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1.0 INTRODUCTION

Under an Administrative Order on Consent (AOC) with the Environmental Protection Agency, the City of Tacoma has performed a significant amount of sampling and analysis in recent years of the storm drains entering the Thea Foss and Wheeler-Osgood Waterways. The purpose of the sampling efforts were to evaluate the quality of stormwater discharges to the Thea Foss Waterway and the effect of these discharges on sediment quality. The results of these efforts are being used in an overall evaluation of source loadings to the waterway to determine whether recontamination of the sediments following cleanup would be expected based on the current discharge concentrations. Through this process a preliminary list of "contaminants of concern" has been identified. These are the contaminants which have the potential to recontaminate based on the model predictions. This preliminary list of "contaminants of concern" was used to focus source control efforts. The City is currently working with the Environmental Protection Agency (EPA) to finalize this list.

The first stormwater sampling of the Foss outfalls under the AOC occurred in 1995-1996. The result of this sampling and modeling performed in 1996 identified a data gap which limited the ability to complete the recontamination assessment and fully define the list of contaminants of concern for the storm drain source control program. Detection limits for several undetected constituents in the stormwater were not low enough to evaluate compliance with the sediment quality objectives.

In order to address this data gap, the City of Tacoma agreed to perform additional sampling to complete the recontamination assessment. Two methods were used to better quantify pollutant loads to the waterway. The two methods were: 1) resampling of selected municipal stormwater outfalls (237A and 237B) using improved whole-water detection limits; and 2) installing in-line sediment traps in selected municipal stormwater outfalls. The constituents which required improved quantitation in Round 3 were PAHs, PCBs, mercury, hexachlorobenzene and chlorinated pesticides.

As part of the Round 3 sampling effort, one baseflow event and one storm flow event were sampled from Outfalls 237A and 237B in July 1996 and October 1996, respectively. The samples were collected as whole-water, flow-composited samples according to procedures described in the Stormwater Evaluation Plan dated November 1996. The samples were analyzed for TSS, PAHs, hexachlorobenzene, DDD, DDE, and PCBs. Baseflow and storm flow events were also sampled from the two outfalls in November 1996 and October 1996, respectively, for low-level mercury analysis using EPA Draft Method 1631. Ultraclean sampling techniques were employed in this effort.

The improved detection limits, required to assess recontamination potential, were as follows:

PAHs	0.01 µg/L
Hexachlorobenzene	0.01 µg/L
PCBs	0.01 µg/L

Pesticides	0.001 µg/L
Mercury	0.0001 µg/L

Between September 1996 and January 1997, sediment traps were installed in the drainage systems for Outfalls 230, 237A and 237B. This effort was performed cooperatively with the Department of Ecology. Results of this sampling effort were summarized in a Technical Memorandum prepared by the Department of Ecology dated May 1997. Results of the sediment analysis were also included as Appendix L of the Draft Round 3 Data Evaluation and Pre-Remedial Design Evaluation Report.

In using this new data to develop loadings for the recontamination assessment, whole-water data (either from the original data set or the new, low detection limit data) was used for most constituents. Sediment trap data was used to develop loadings for two PAHs (indeno(1,2,3-cd)pyrene and dibenz(a.h)anthracene), 4-4'DDD, 4-4'DDT, and Total PCBs. Based on the updated analysis, the chemicals which show the potential to recontaminate sediments are BEP, phenanthrene and dibenz(a.h)anthracene, along with indeno(123-cd)pyrene and zinc. Additional analyses are underway to finalize the list of contaminants of concern. In addition, source control actions to reduce loadings of these constituents are continuing.

A second round of sediment trap sampling was initiated between December 1997 and February 1998. Traps were installed in the drainage system for Outfalls 237A and B, 230, 235 and 245. In addition, one trap was installed at a location to evaluate DOT runoff and a second to evaluate background residential runoff. Results of this effort were summarized in a report prepared by Ecology dated December 1998.

A third round of sediment trap sampling was initiated by the City of Tacoma in the Fall of 1998. Traps were placed in the drainage systems for outfalls 235 and 237A as part of a source control investigation related to the former Coal Tar Gasification Site area. Samples were collected from these sediment traps in February and analytical results are pending.

As outlined in a October 30, 1996 letter from the City of Tacoma to EPA, following completion of source control activities in each of the basins draining to the Thea Foss Waterway, the City is initiating an outfall sampling program for outfalls in an attempt to determine whether reduction in any contaminants of concern have been realized (i.e. the effectiveness of the source control program). The details of this monitoring program are described in this Sampling and Analysis Plan.

2.0 DRAINAGE BASIN DESCRIPTION

The Thea Foss Waterway subwatershed is one of five subwatersheds located within the Commencement Bay Watershed. Drainage basins within the subwatershed have been identified and boundaries have been defined.

This sub-watershed covers approximately 5,751 acres and is comprised of drainage basins located in the south-central portion of Tacoma. The area borders the North Tacoma Sub-Watershed on the north, Lawrence St. on the west, and East F to East K Streets on the east. The area extends as far south as 86th Street and also includes portions of the tideflats (including Middle and St. Paul Waterway) on the east side of Foss Waterway. (See Figure 1)

The City's primary outfalls to the Thea Foss Waterway are 237A & B (the twin 96ers), 230, 245, 254, 218, 214, 225, 235, 243, and 248. Primary land uses within the basins draining to each of these outfalls is as follows:

Outfall	
237A	residential, commercial and industrial
237B	residential
230	commercial
245	commercial and industrial
254	industrial
218	industrial
214	industrial
225	business, commercial and light industrial
235	residential, commercial and industrial
243	industrial
248	industrial

Land use in the sub-watershed is predominately residential, although most of Tacoma's commercial businesses are located in this watershed. There are some industrial uses, concentrated mainly in the tideflats and Nalley Valley portions of the watershed.

3.0 SCOPE OF SAMPLING AND ANALYSIS EFFORT

3.1 General

As described in the Introduction, the City is continuing to work with the Environmental Protection Agency to finalize the list of contaminants of concern for the waterways. Contaminants of Concern (COCs) are those contaminants which have been identified through modeling to have the potential to recontaminate the waterway, and are therefore the primary target for source control activities for the storm drains as well as for other potential sources. At this time it appears that bis(2ethyl-hexyl)phthalate and various PAHs are the primary COCs for the waterways. Once the COC identification effort has been finalized, this monitoring plan may be modified as necessary to refocus the program and ensure that it provides all necessary information for the recontamination analysis and for qualitative evaluation of source control effectiveness. In addition, this monitoring program will be reevaluated during each permit term and may be modified to meet changing conditions.

Monitoring to be performed under this Sampling and Analysis Plan will include both whole-water and in-line sediment trap sampling, in addition to some sump and catch basin monitoring. Each of these components is described in more detail below. For all sampling efforts, the samples will be analyzed for problem chemicals identified in the AOC including semi-volatiles, selected metals, pesticides and PCBs. In addition, samples will be analyzed for TOC and TSS. A complete listing of analytes including analytical methods and detection limits are provided in Table 1.

In addition to the monitoring efforts described in this Sampling and Analysis Plan, the City will continue to perform source tracing investigations as necessary when potential source control problems are identified. In general, these activities will follow the outline presented in the Source Control Flowchart (Figure 3-3 in the Stormwater Management Manual - Volume III, March 1999). The City will contact Ecology when problems are identified and will discuss follow-up sampling or investigations planned. Results of any sampling performed along with the conclusions of these investigations, will be submitted to Ecology when they become available. Quarterly reports will be submitted to Ecology to provide updated information on the status of ongoing/completed investigations.

In the following sections, several City Laboratory Standard Operating Procedures (SOPs) are referenced. All laboratory SOPs are currently on file with Ecology and are available for review upon request.

3.2 Objectives

The objectives of this Sampling and Analysis Plan (SAP) are:

- Develop a sampling and analysis plan (SAP) that is consistent with listed analytical protocols.
- Coordinate the planning of this project with EPA and Ecology and keep them apprised of the progress.
- Provide Ecology and EPA with data characterizing the quality of the water discharging into Thea Foss and Wheeler-Osgood Waterways.
- Conduct field operations at the outfalls and collect water samples as specified in this SAP.
- Conduct field operations at specified manholes and collect sediment trap samples as specified in this SAP.
- Monitor sediment accumulation in the sump manhole upstream from Outfall 245 and collect samples from this sump as specified in this SAP.
- Submit the water and sediment samples to the City Laboratory for analysis of semi-volatiles, selected metals (cadmium, chromium, copper, lead, mercury, nickel, and zinc), pesticides/ PCBs, and TSS. Samples for analysis of TOC will be submitted to an outside contract laboratory.

- Review the analytical data to assure data quality.
- Produce a data report with quality control information and analytical results.
- Deliver a data report to Ecology and EPA.

3.3 Sampling Locations

3.3.1 Outfall Sampling Locations

The City plans to collect whole-water samples at the following outfalls: 230 (15th and Dock St.), 235 (21st and Dock St.), 237A and B (twin 96ers), 243 (21st and D St.), 245 (19th and east D St.) and 254 (Wheeler-Osgood). These outfall locations are shown in Figure 2. For each location, samples will be taken 4 times annually. Samples will be taken during storm flow and base flow conditions at each of the above listed outfalls during the wet season (approximately March) and the dry season (approximately September). Storm flow conditions are defined as total precipitation of at least 0.2 inches in the 24 hours before sample collection. Dry weather or base flow conditions are defined as total precipitation of less than 0.2 inches in the 24 hours before sample collection. Precipitation measurements are recorded daily at the City's Central Treatment Plant and will be used to determine the storm or dry weather conditions.

In general, samples will be taken from the end of the outfall pipe. Some outfalls are tidally influenced and at times it may be difficult to coordinate the appropriate tide with the appropriate storm or dry period. In cases where the appropriate storm or dry period is present, but the outfall is tidally influenced it may be necessary to move upstream to the first manhole that is not under tidal influence. The City laboratory has considerable experience in sampling under these conditions and every effort will be made to match the appropriate weather conditions with the tidal conditions so end of pipe samples can be obtained.

3.3.2 Sediment Trap Sampling Locations

Sediment trap sampling will be performed at the locations indicated on Figure 3 and described in Table 2. As previously mentioned, several of the outfalls, primarily those on the east side of the waterway, are tidally influenced and sediment trap sampling will not be used at this time. Traps will be installed annually in the fall. Sediment traps are generally left in place 2-3 months to collect adequate sample volume to perform the required analyses.

In addition, sediment traps will be used during the remainder of the year as needed in source control investigations or for source tracking to identify areas within a basin which may be contributing contaminants of concern. (See Section 3.11)

3.3.3 Sump Manhole Sampling Locations

In the basin for outfall 245 there is a sump manhole immediately upstream of the outfall (Figure 3). This sump is designed to collect approximately 5-6 feet of sediment. Once per year, in the fall, the sump will be inspected to assess the quantity and quality of the accumulated sediments.

A sample will be taken from this sump to assess the nature of sediments which may be entering the waterway from this basin. Following collection of the sample, the sump will be cleaned.

3.4 Sample Collection and Processing

3.4.1 Outfall Sample Collection and Processing

The sampling crew will collect flow weighted composite samples at each outfall during dry and wet weather conditions during the wet season (approximately March) and the dry season (approximately September). A computer program will be used to predict tidal windows at each outfall. A schedule is prepared at the beginning of each month indicating times where a sufficient window (2 hours minimum) will allow access to collect either dry or wet weather samples. The wastewater treatment plant operations personnel, which staff the treatment plant 24 hours/day, are given a schedule of tidal windows and are instructed to call the sampling crew if it begins to rain during the tidal window and street runoff is occurring. When called, the sampling crew evaluates the window and determines if they have enough time to respond and collect samples in the window that remains.

All sampling equipment and containers are prepared prior to the sampling event (Glassware Cleaning SOP). The sampling crew can respond within 20 minutes to the staging area (wastewater treatment plant) and be onsite and sampling within 40 minutes from initial notification. The outfalls are typically accessed from the landside.

One-liter glass containers are filled every 15 minutes at each outfall. In addition, the depth of the water in each pipe is recorded and the time of each sample is noted (Field Sampling Logbook SOP). When the sampling window closes, the sampling crew returns to the laboratory with the discreet samples from each outfall.

At the laboratory, flow at the time each grab sample was taken is calculated based on the water depth, pipe size, pipe slope, and pipe roughness. Calculations are then made based on calculated flows to determine how much of each discreet sample is used to make up the flow weighted composite for each outfall (Flow Weighted Composite Sample Collection SOP). The flow weighted composite sample for each outfall is logged in, preserved, and stored at 4°C until analyzed (Sample Receipt and Control and Sample Storage and Preservation SOPs).

Each sample will be stored in coolers with ice during transport from the field to the lab. Where appropriate, preservatives will be added in the field. Once in the laboratory, the lab's SOP for sample handling and storage will be followed. Sample container and storage requirements are presented in Table 1. After analysis, leftover sample will be archived according to the lab's SOP.

Glassware and containers for collecting samples will be provided by the City Lab. Containers will be pre-cleaned according to laboratory SOP. Additional jars will be available to allow for breakage. Each sample container will be clearly labeled with the project name, sample

identification, date and time, initials of person(s) preparing the sample, analysis specifications, any pertinent comments such as preservatives present in the sample. Each sample will be referenced by entry onto the field log sheets.

3.4.2 Sediment Trap Sample Collection and Processing

Sediment trap sampling will be performed in general accordance with the Quality Assurance Project Plan dated January 1998 prepared by Dale Norton.

The sediment traps will be deployed annually at each of the sampling locations shown in Figure 3 and described in Table 2. Weather conditions will dictate the exact timing of the deployment and retrieval of the traps. The traps will be installed near the bottom of the junction boxes where possible. Alternately, the traps will be mounted where eddies are occurring within a pipe. City of Tacoma Sewer Utility crews that are certified for confined space entry will install the traps at each of the sampling locations. A diagram of the general construction details of the sediment traps are presented in Figure 4.

At the end of the deployment period, the collection bottles will be removed from the mounting brackets, capped with screw closures, packaged and placed in coolers on ice for transport to the City's laboratory for processing. Processing will begin within 24 hours of retrieval. Any samples obtained prior to the end of the planned deployment period will be frozen until processed.

Processing will consist of first decanting off as much of the overlaying water as possible and then collecting the sample from the container. Manipulation of the samples will be accomplished using stainless steel utensils. These utensils will be cleaned prior to use in accordance with the laboratory SOP.

Sediment trap collection bottles will be one-liter Teflon bottles with Teflon lids. All sub-sample containers will be glass jars with Teflon lid liners, cleaned to EPA QA/QC specifications..

3.4.3 Sump Sample Collection and Cleaning Process

Once per year, in the fall, a depth measurement of accumulated sediment will be obtained in the manhole sump serving Outfall 245. A sediment sample will then be obtained and analyzed in accordance with the objectives stated herein. Every effort will be made to obtain a sample which is representative of the entire contents of the sump. Following completion of the analysis, the results will be reviewed to determine the proper method for cleaning and disposal. As a general rule, waste designated as a 'dangerous waste' under Chapter 173-303 WAC, Dangerous Waste Regulations, will be handled and disposed by a licensed contractor. The potential for designation as a dangerous waste should not be a concern following repair of the line which will prevent further infiltration of contaminants into the line.

3.5 Sample Analysis

For all sampling efforts described above, the samples will be analyzed for the problem chemicals identified in the AOC including semi-volatiles, selected metals, pesticides and PCBs. In addition, samples will be analyzed for TOC and TSS. All analyses will be performed by the City laboratory with the exception of TOC, which will be performed by an outside contract laboratory. Table 1 includes a listing of analytes, analytical methods, and target detection limits. Split samples will be made available to Ecology, EPA or their representatives, provided that the request is made in advance, proper containers are supplied to the City and excess sample is available.

3.6 Data Quality Objectives

The precision and accuracy routinely achieved with the methods selected will be adequate for the purposes of this project A duplicate sample will be analyzed when sufficient sample volume is available to provide an estimate of overall variability in the data.

Results of work conducted in the past indicated that the use of in-line sediment traps have the ability to collect representative samples of stormwater particulates. End of pipe whole water samples will be flow-weighted composite samples, so samples will be representative of the discharge during the sampling event.

The completeness and usability of the data will be maximized by using proven sampling techniques, packaging samples for transport to avoid breakage and timely processing at the laboratory. The analytical requirements in sample volumes to achieve analysis goals will be met to assure acceptable data. Where possible excess sample will be archived until the laboratory results can be reviewed by the project manager. The goal for generation of useable data will be 100%.

For comparability, analytical methods were selected to be appropriate for comparison with the SQOs and historical data sets.

Standard Quality Control procedures used by the City of Tacoma Laboratory will be used for this project as documented in the laboratory's Standard Operating Procedures. At a minimum, quality control samples will include analysis of surrogates, internal standards, method blanks, and duplicate matrix spikes. Specific recommendations for QC samples, control limits and corrective actions are listed in the City Labs QA manual or the method being used. Field QC samples will include one set of duplicates. Duplicates are single samples homogenized and split into two aliquots for analysis.

3.7 Field Measurements and Miscellaneous Data

In addition to physical collection of the samples, specific field information will be recorded. A field data log will be used to note the date, time, and location of sampling stations as well as depth of the water in the pipe at the end of the outfall during collection of the outfall samples. The following data will be included on the data log:

- General field observations including, but not limited to, weather conditions, presence of other activities in the area, and any factors which may effect the quality of the data.
- Whether sample was collected under storm or dry conditions.
- Date and time of collection of each sample.
- Names of field coordinators and person(s) collecting and logging in the samples.
- Observations made during sample collection.

3.8 Sample Transport and Chain-of-Custody Procedures

Chain-of-custody forms will be completed immediately after sampling. All sample containers will be carefully packed in coolers to prevent breakage and transported in an upright position, on ice, to the City laboratory directly after collection. Upon delivery of the samples to the lab, representatives will verify that sample descriptions on the Chain-of-Custody are consistent with actual delivered samples. The Chain-of-Custody will then be signed with the date and time included in the appropriate spaces. (See Figure 5 for an example Chain-of-Custody form.)

3.9 Laboratory Written Report

A written report will be prepared by the City Laboratory documenting all the activities associated with the sample analyses. The laboratory report will be supplied to Ecology and EPA after the samples from each sampling event have been collected and analyzed. At a minimum, the following will be included in the report:

- Results of the laboratory analyses
- Laboratory QA/QC Report
- All protocols used during analyses and explanation of any deviations from the sampling plan protocols
- Explanation of any deviation from chain-of-custody procedures identified in this plan
- Location and availability of data.

As appropriate, this plan may be referenced in describing protocols.

3.10 Final Data Report

A written data report shall be prepared annually by the City for submittal to Ecology and EPA, This report will document all activities associated with chemical analysis of samples. The

chemical reports will be included as appendices. The following will be included in the final report:

- Type of sampling equipment used.
- Protocols used during sampling and testing, and an explanation of any deviations from the sampling plan protocols.
- Locations where the samples were collected. Locations will be shown on a map.
- Tabular presentation of analytical results.
- Chain-of-custody procedures used, and explanation of any deviations from the sampling plan procedures.

In addition, the outfall data collected during the monitoring will be added to the data base for analysis of trends in stormwater quality. New data will be plotted with existing data for comparative purposes, and new averages will be computed to evaluate any trends in the results. Data will be used to continue the qualitative assessment of the effectiveness of the stormwater source control program. Stormwater data is generally quite variable and single outfall sample results are not generally a reliable indication of the need for additional source control measures in a particular basin. However, if a particular concern is identified as a result of this sampling effort, source control investigations will be focused in that basin.

Sediment trap and sump sampling results will provide additional data for analyzing trends in stormwater quality and for qualitative assessment of the effectiveness of source control measures and the need for additional source control efforts in a particular drainage basin.

3.11 Source Tracing/Source Control Investigations

Sediment traps will be used as needed for source control investigations and source tracing. The City's general approach for source control is outlined in the Source Control Flow Chart. When on-going discharges of materials or contaminants are identified, additional investigations are conducted to track, confirm and identify a specific source(s). Sediment traps may be used as a tool during these source control investigations.

If results from outfall monitoring indicate a potential problem with a particular constituent(s) within a basin, sediment traps will be deployed at key locations upstream in an attempt to isolate the problem area for further field screening or "source tracing." These efforts will be coordinated with Ecology staff.

4.0 PROJECT TEAM AND RESPONSIBILITIES

Successful completion of the sampling and analysis requires coordination and adherence to the SAP and QA/QC procedures. Staffing and responsibilities are outlined below.

4.1 Project Planning and Coordination

Project coordination is the responsibility of Mary Henley of the Utility Services Engineering Division, Public Works Department. Ms. Henley is the primary project contact. This sampling and analysis plan (SAP) was developed by City staff.

4.2 Field Sample Collection

City personnel will be responsible for the collection of the samples. The field team will consist of Rick Fuller, City laboratory personnel and, as necessary, other City staff . Ms. Henley will work closely with Christopher Getchell, the supervisor of the City's laboratory, to ensure consistency with this plan. City staff will collect the samples and record the necessary data on those samples.

4.3 Chemical Analyses

The samples will be submitted to the City of Tacoma's laboratory for the analysis of semi-volatiles, selected metals, pesticides/PCBs, and TSS. The City lab is accredited by the Department of Ecology for the listed analyses. Samples for TOC analysis will be submitted to an accredited contract laboratory. All lab SOPs are on file with Ecology and are available for review upon request.. Mr. Getchell will provide oversight of the analytical laboratories, ensuring strict adherence to the procedures defined in the this SAP. Lori Zboralski of the City's laboratory will perform the QA/QC review of the data. The data will be assembled into tabular format and included as part of the final data report. A list of parameters, analytical methods, and target detection limits is included in this report as Table 1.

4.4 QA/QC Management

Mr. Getchell will provide a final QA review of the analytical data for accuracy and omissions, and review the field data and collection procedures for adherence to the sampling plan.

4.5 Final Data Report

Ms. Henley will be responsible for assembling the final report describing sample locations; sampling, handling, and analytical methods; data reports including QA/QC; and an evaluation of data results.

TABLES

TABLE 1

Parameters	METHOD	Est. Method Det. Limit	Container Type	Holding Time	Preservative
Metals Analytes					
Cadmium-Total; Digestion followed by:	3050A + 6010A	1ug/L/ 0.1 mg/Kg	P/G/AW	6 m	HNO3<2*, Cool 4 deg C
Chromium-Total; Digestion followed by:	200.7/6010A	1 ug/L/ 0.1 mg/Kg	P/G/AW	6 m	HNO3<2*, Cool 4 deg C
Copper-Total; Digestion followed by:	3050A + 6010A	3 ug/L/ 0.3 mg/Kg	P/G/AW	6 m	HNO3<2*, Cool 4 deg C
Lead-Total; Digestion followed by:	3050A + 6010A	2 ug/L/ 0.2 mg/Kg	P/G/AW	6 m	HNO3<2*, Cool 4 deg C
Mercury-Total:	7471	0.2 ug/L/ 0.02 mg/Kg	P/G/AW	28 d	HNO3<2*, Cool 4 deg C
Nickel-Total; Digestion followed by:	3050A + 6010A	1 ug/L/ 0.1 mg/Kg	P/G/AW	6 m	HNO3<2*, Cool 4 deg C
Zinc-Total, mg/L; Digestion followed by:	3050A + 6010A	1 ug/L? 0.1 mg/Kg	P/G/AW	6 m	HNO3<2*, Cool 4 deg C
Conventionals Analytes					
Total Solids (on sediment samples)	160.3/SM2540 B	1%	P/G	7 d	Cool 4 deg C
TSS	160.2/SM2540 D	1 mg/L	P/G	7 d	Cool 4 deg C
Total Organic Carbon by IR	9060 with IR	5 mg/L/ 0.1%	P/G	28 d	H2SO4<2*, Cool 4 deg C
Pesticide Analytes					
Aldrin	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
alpha BHC	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
beta BHC	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
gamma BHC (Lindane)	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
delta BHC	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
alpha Chlordane	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
gamma Chlordane	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
4,4'-DDD	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
4,4'-DDE	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
4,4'-DDT	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Dieldrin	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Endosulfan I	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Endosulfan II	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Endosulfan Sulfate	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Endrin	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Endrin Aldehyde	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Endrin Ketone	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Heptachlor	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Heptachlor Epoxide	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Hexachlorobenzene	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Hexachlorobutadiene	8081	0.01 ug/L / 8 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Methoxychlor	8081	0.05 ug/L / 40 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
Toxaphene	8081	0.25 ug/L / 200 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1016	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1221	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1232	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1242	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1248	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1254	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C
PCB 1260	8081	0.1 ug/L / 80 ug/Kg dry	G	7d / 10d	35d, Cool 4 deg C

Holding time: d=day, m=month, 7d ext./40d=7 days to extract, 40 days for anal.
Container: P=plastic (PETor equiv.), G=glass, AW=acid washed
* for Water samples only
**by Selected Ion Monitoring

TABLE 1

Parameters	METHOD	Est. Method Det. Limit	Container Type	Holding Time	Preservative
Semi-Volatile Analytes					
Acenaphthene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Acenaphthylene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Aniline	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Anthracene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzidine	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzo(a)anthracene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzo(a)pyrene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzo-fluoranthenes	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzo(g,h,i)perylene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzoic acid	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Benzyl alcohol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Biphenyl	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
bis(2-Chloroethoxy)methane	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
bis(2-Chloroethyl)ether	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
bis(2-Ethylhexyl)phthalate	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Bromophenyl phenyl ether	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Butyl benzyl phthalate	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Carbazole	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Chloroaniline	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Chloro-3-methylphenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2-Chloronaphthalene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2-Chlorophenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Chlorophenyl phenyl ether	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Chrysene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Di-n-butyl phthalate	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Di-n-octyl phthalate	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Dibenz(a,h)anthracene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Dibenzofuran	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Dibenzothiophene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
1,2-Dichlorobenzene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
1,3-Dichlorobenzene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
1,4-Dichlorobenzene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
3,3'-Dichlorobenzidine	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,4-Dichlorophenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Diethyl phthalate	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,4-Dimethylphenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Dimethyl phthalate	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,4-Dinitrophenol	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,4-Dinitrotoluene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,6-Dinitrotoluene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
1,2-Diphenylhydrazine	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Fluoranthene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Fluorene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Hexachlorobenzene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Hexachlorobutadiene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Hexachlorocyclopentadiene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Hexachloroethane	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Indeno(1,2,3-c,d)pyrene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Isophorone	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2-Methyl-4,6-dinitrophenol	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2-Methylnaphthalene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2-Methylphenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Methylphenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Naphthalene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Nitrobenzene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2-Nitroaniline	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
3-Nitroaniline	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Nitroaniline	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C

Holding time: d=day, m=month, 7d ext.?40d=? days to extract, 40 days for anal.

Container: P=plastic (PETor equiv.), G=glass, AW=acid washed

* for Water samples only

**by Selected Ion Monitoring

TABLE 1

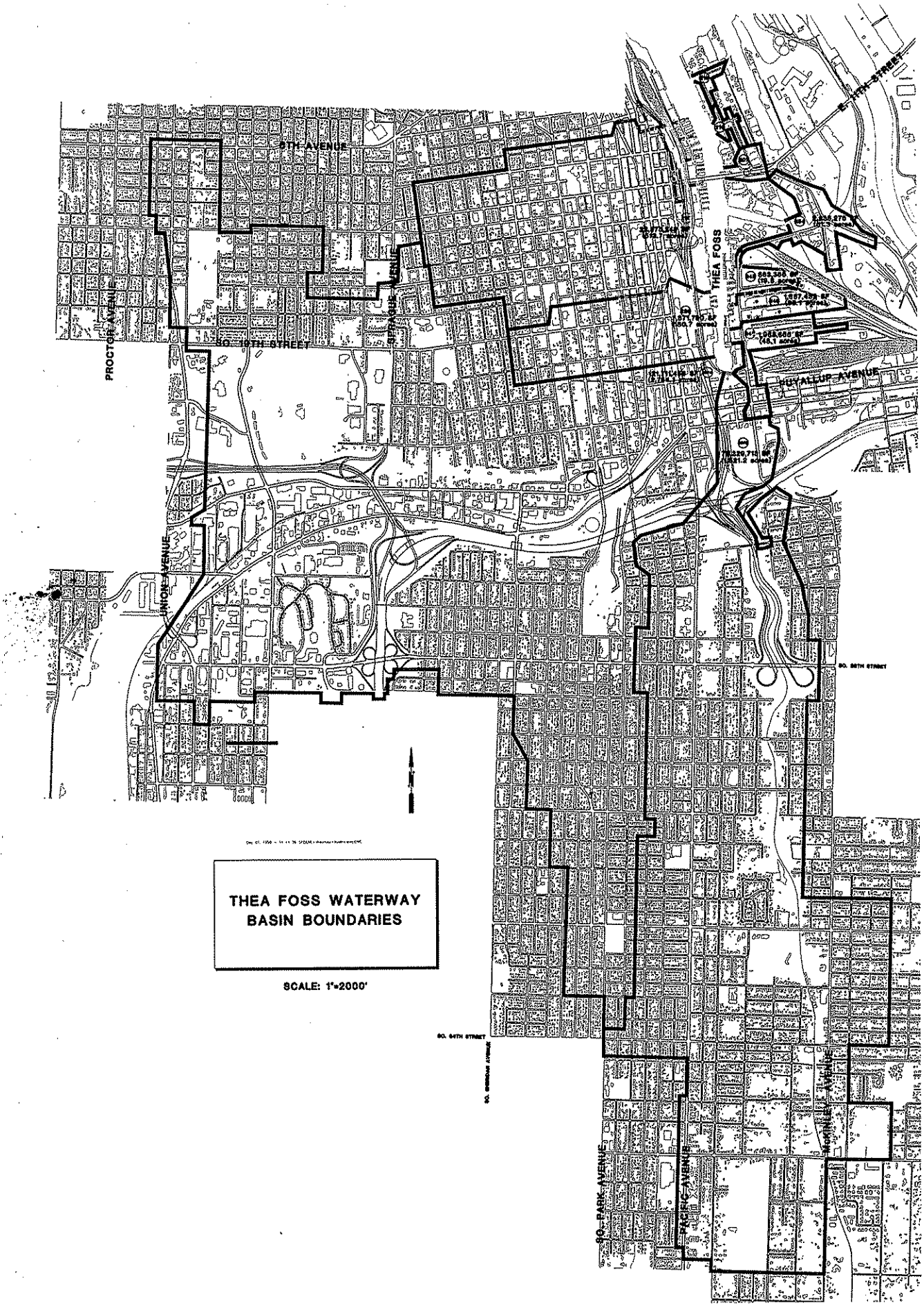
Parameters	METHOD	Est. Method Det. Limit	Container Type	Holding Time	Preservative
Semi-Volatile Analytes					
2-Nitrophenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
4-Nitrophenol	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
N-Nitroso-di-n-propylamine	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
N-Nitrosodimethylamine	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
N-Nitrosodiphenylamine	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,2'-oxybis(1-Chloropropane)	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Pentachlorophenol	CLP SOW OLM03.1	5 ug/L / 500 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Phenanthrene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Phenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
Pyrene	CLP SOW OLM03.1**	0.01 ug/L / 1 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
1,2,4-Trichlorobenzene	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,4,5-Trichlorophenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C
2,4,6-Trichlorophenol	CLP SOW OLM03.1	1 ug/L / 100 ug/Kg wet	G	7d / 10d	40d, Cool 4 deg C

Holding time: d=day, m=month, 7d ext./40d=7 days to extract, 40 days for anal.
Container: P=plastic (PETor equiv.), G=glass, AW=acid washed
* for Water samples only
**by Selected Ion Monitoring

Table 2
DESCRIPTION OF IN-LINE SEDIMENT TRAP SAMPLE LOCATIONS

Outfall	Location Description	Location Characteristics	Comments
237B	Dock St. Pump Station yard; 2300 block E. C	Manhole located immediately upstream of outfall pipe; represents entire drainage basin.	
237A	Dock St. Pump Station yard; 2300 block E. C	Manhole located immediately upstream of outfall pipe; upstream of 23rd St. lateral.	Combined, these two locations represent the entire drainage basin.
237A	E. 23rd & Dock Street	Manhole located immediately upstream of connection into main line; 23rd St. lateral	
235	E. 21st & Dock Street	Manhole located immediately upstream of outfall pipe; represents entire drainage basin.	
230	S. 15th & Court A	Manhole located beneath 15th St. off-ram (I-705); main line on S. 15th Street.	Combined, these three locations represent the entire drainage basin.
230	S. 15th & Court A	Manhole located beneath 15th St. off-ram (I-705); lateral on Ct. A, north of 15th St.	
230	Pacific Ave. & Hood St.	Manhole located on sidewalk near intersection; lateral south of 15th St.	
243	E. 21st & D Street	Manhole located immediately upstream of outfall pipe; represents entire drainage basin.	
245	E. 19th & D Street	Manhole sump in Johnny's Restaurant parking lot, immediately upstream of outfall pipe .	Sump serves as a sediment trap.

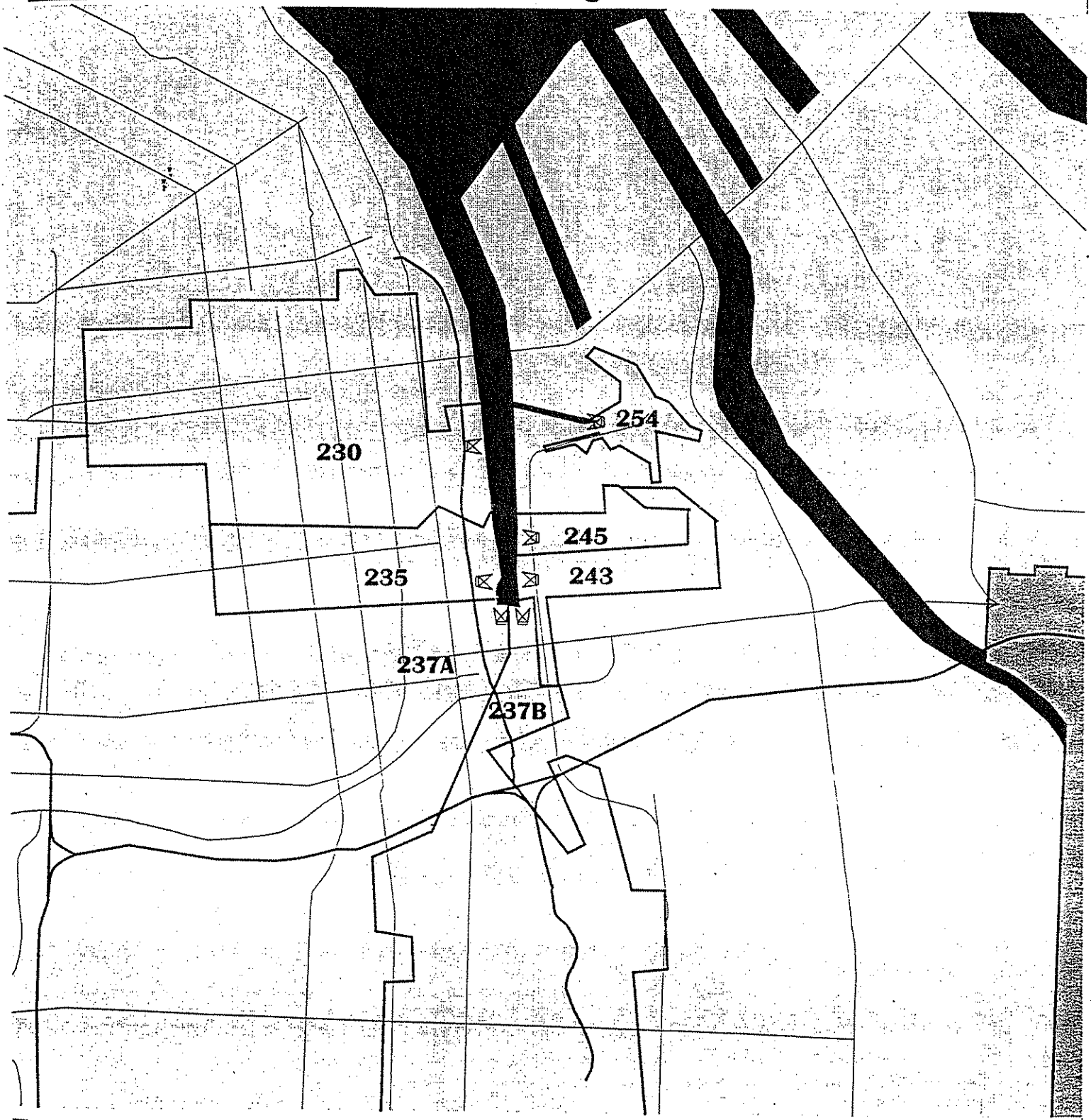
FIGURES



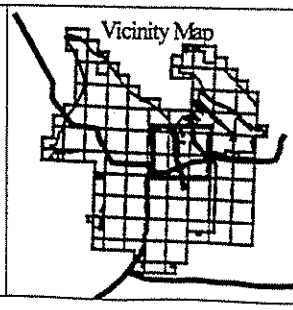
THEA FOSS WATERWAY
BASIN BOUNDARIES

SCALE: 1"=2000'

Thea Foss Waterway
Outfall Monitoring Locations



Vicinity Map



City of Tacoma
Department of Public Works
Sewer Utility

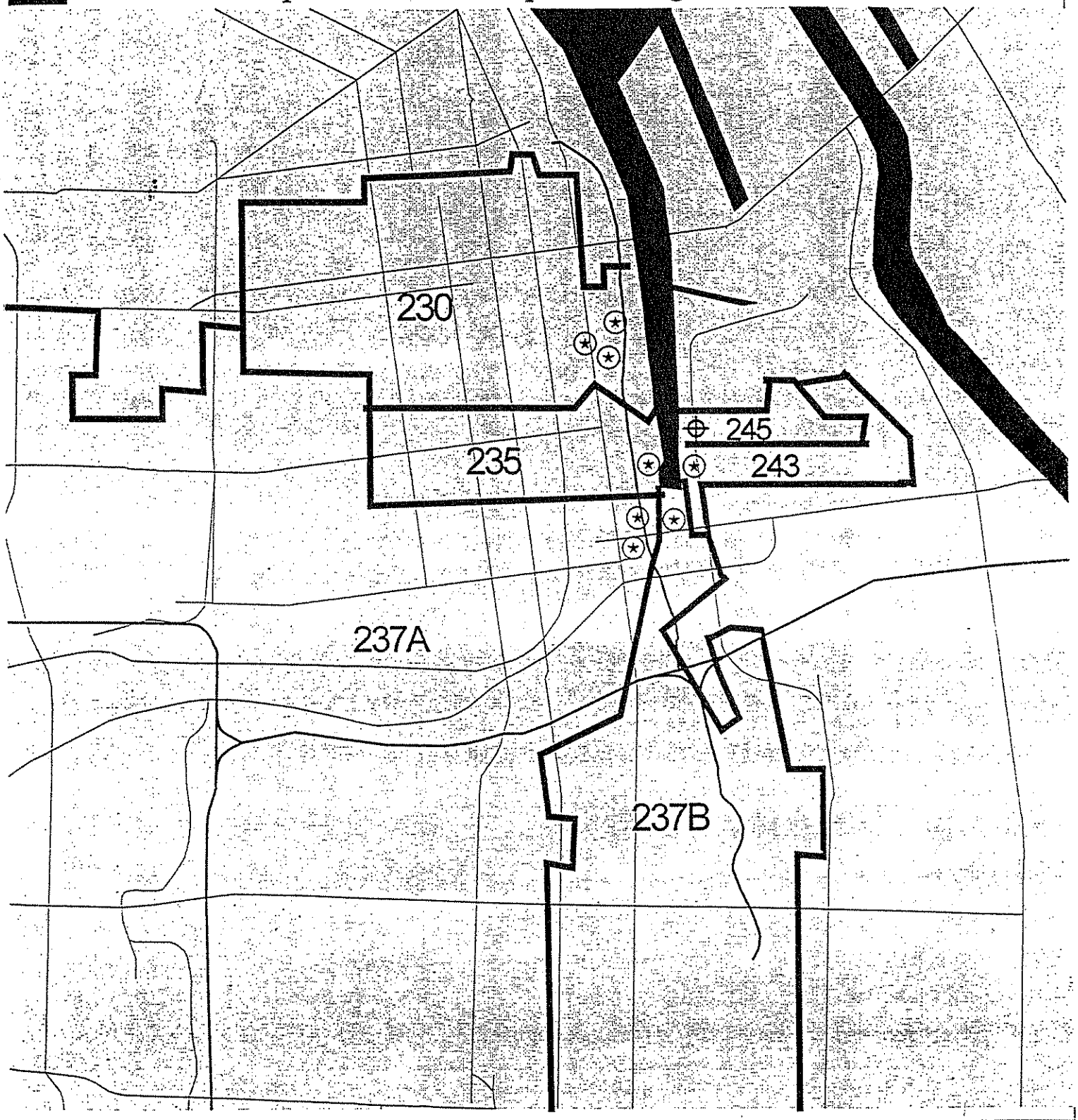
N

0 1591 3182 4773 6

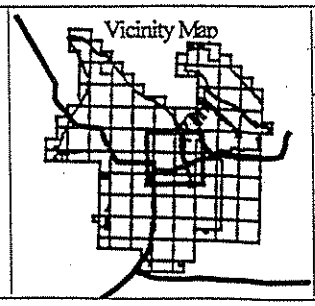
Map Produced by: Troy Naccarato

FIGURE 2

Thea Foss Waterway Subwatershed
Proposed Sediment Trap Monitoring Locations



Vicinity Map



City of Tacoma
Department of Public Works
Sewer Utility

N

0 1591 3182 4773 6

Map Produced by: Troy Naccarato
On January 26, 1999

FIGURE 3

Construction Details of Stormwater Sediment Trap

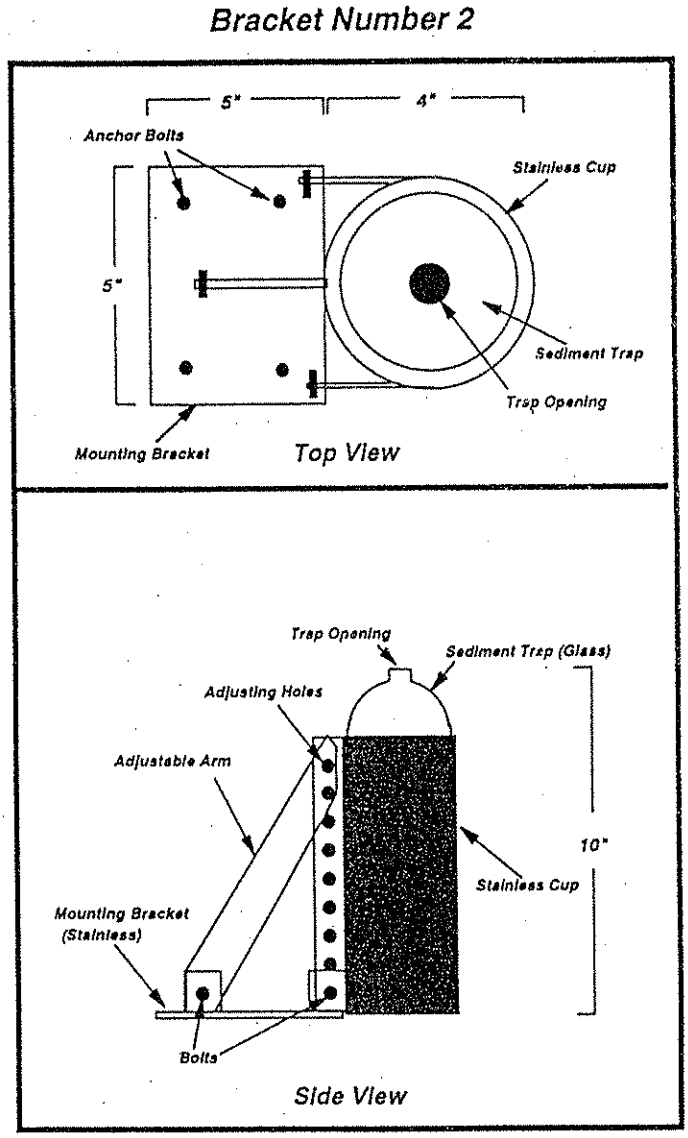


FIGURE 4

City of Tacoma
Public Works—Utility Services
Engineering Division

Chain of Custody Record

Send results & invoice to:
Treatment Plant 1 Attn: LAB
2201 Portland Avenue
Tacoma, WA 98421
(206) 591-5588

Project No.	Project Name
Samplers (Signature)	

Sta. No.	Date	Time	Grab	Comp.	Station Location/ID No.	Total Containers	Analysis/No. of Containers						Sampler's Initials	COC Seals Intact	Remarks

Relinquished By (Signature)	Date	Time	Received By (Signature)	Relinquished By (Signature)	Date	Time	Received By (Signature)
Relinquished By (Signature)	Date	Time	Received By (Signature)	Relinquished By (Signature)	Date	Time	Received For Laboratory By (Signature)
Relinquished By (Signature)	Date	Time	Received For Analysis By (Signature)	Date	Time	Remarks	

DISTRIBUTION: WHITE—Laboratory CANARY—Other PINK—Inorganics GOLDENROD—Organics

PWK 5235 0068 (11/95)

Example Chain of Custody Record

FIGURE 5